

Claims:

1. A method of assembling a pulley apparatus with built-in roller clutch for use in belt transmission of an auxiliary machinery of an engine, the pulley apparatus comprising a pulley member, a shaft member provided on the radially inner side of the pulley member, a first ball bearing provided between the pulley member and the shaft member on one side in the axial direction thereof, a second ball bearing provided between the pulley member and the shaft member on the other side in the axial direction thereof, and a roller clutch provided between the pulley member and the shaft member, a. the first ball bearing comprising an outer diameter section provided in the inner peripheral portion of the pulley member and having a first outer raceway in the inner peripheral surface thereof, an inner diameter section provided in the outer peripheral portion of the shaft member and having a first inner raceway in the outer peripheral surface thereof, and a plurality of first balls provided between the first inner raceway and the first outer raceway, b. the second ball bearing comprising an outer race provided separate from the pulley member, fitted into the inner peripheral surface of the pulley member and having a second outer raceway in the inner peripheral surface thereof, an inner race fitted onto the outer peripheral surface of the shaft member to cooperate with the shaft member to form a

shaft member unit and having a second inner raceway in the outer peripheral surface thereof, and a plurality of second balls provided between the second inner raceway and the second outer raceway, c. the roller clutch adapted to be locked in one of the rotation directions and unlocked in the other of the rotation directions, and comprising an outer diameter section provided in the inner peripheral portion of the pulley member, an inner diameter section provided in the outer peripheral portion of the shaft member and having a cam portion on the outer peripheral surface thereof, a plurality of rollers provided between the outer peripheral surface of the inner diameter section and the inner peripheral surface of the outer diameter section, a retainer provided between the outer diameter section and the inner diameter section and having pockets to hold the rollers on the inside thereof, respectively, and a plurality of springs engaged with the retainer to press the rollers, respectively, d. the inner diameter section of the roller clutch having a second fitting portion to be engaged with a first fitting portion provided in the retainer of the roller clutch, e. the retainer of the roller clutch having a falling-prevention means for the rollers in addition to the first fitting portion, f. the shaft member unit having a plurality of stepped sections two of which are used to form a means to regulate displacement in the axial direction of the retainer of the roller

clutch, g. with the rollers being held in the pockets in the retainer of the roller clutch and pressed by the springs engaged with the retainer, respectively, installing the retainer on the radially inner side of the outer diameter section of the roller clutch to form an assembly, h. providing the cam portion of the inner diameter section of the roller clutch in alignment in phase with the rollers of the assembly, to insert the inner diameter section of the roller clutch below the rollers, i. then, fixing either one of the retainer of the roller clutch and the inner diameter section of the roller clutch of the assembly with a jig, with the other being rotated, and as well compressing the springs simultaneously, j. then relatively displacing the retainer of the roller clutch and the inner diameter section of the roller clutch in the axial direction with respect to each other for engagement between the first fitting portion and second fitting portion, and k. then installing the second ball bearing between the inner peripheral surface of the pulley member and the outer peripheral surface of the shaft member.

2. A method of assembling a pulley apparatus with built-in roller clutch for use in belt transmission of an auxiliary machinery of an engine, the pulley apparatus comprising a pulley member, a shaft member provided on the radially inner side of the pulley member, a first ball bearing provided between the pulley member and the shaft member on one side in the axial

direction thereof, a second ball bearing provided between the pulley member and the shaft member on the other side in the axial direction thereof, and a roller clutch provided between the pulley member and the shaft member, a. the first ball bearing comprising an outer diameter section provided in the inner peripheral portion of the pulley member and having a first outer raceway in the inner peripheral surface thereof, an inner diameter section provided in the outer peripheral portion of the shaft member and having a first inner raceway in the outer peripheral surface thereof, and a plurality of first balls provided between the first inner raceway and the first outer raceway, b. the second ball bearing comprising an outer race provided separate from the pulley member, fitted into the inner peripheral surface of the pulley member and having a second outer raceway in the inner peripheral surface thereof, an inner race fitted onto the outer peripheral surface of the shaft member to cooperate with the shaft member to form a shaft member unit and having a second inner raceway in the outer peripheral surface thereof, and a plurality of second balls provided between the second inner raceway and the second outer raceway, c. the roller clutch adapted to be locked in one of the rotation directions and unlocked in the other of the rotation directions, and comprising an outer diameter section provided in the inner peripheral portion of the pulley member, an inner

diameter section provided in the outer peripheral portion of the shaft member and having a cam portion on the outer peripheral surface thereof, a plurality of rollers provided between the outer peripheral surface of the inner diameter section and the inner peripheral surface of the outer diameter section, a retainer provided between the outer diameter section and the inner diameter section and having pockets to hold the rollers on the inside thereof, respectively, and a plurality of springs engaged with the retainer to press the rollers, respectively, d. the inner diameter section of the roller clutch having a second fitting portion to be engaged with a first fitting portion provided in the retainer of the roller clutch, e. the retainer of the roller clutch having a falling-prevention means for the rollers in addition to the first fitting portion, f. the shaft member unit having a plurality of stepped sections two of which are used to form a means to regulate displacement in the axial direction of the retainer of the roller clutch, g. at least one of the first fitting portion and second fitting portion having a beveled section to simultaneously compress the springs by way of rotating the retainer of the roller clutch relative to the inner diameter section of the roller clutch corresponding to the engagement between the both fitting portions, h. with the rollers being held in the pockets in the retainer of the roller clutch and pressed by the springs engaged with the

retainer, respectively, and with the rollers being pressed with the springs engaged with the retainer, respectively, installing the retainer on the radially inner side of the outer diameter section of the roller clutch to form the assembly, i. with the concave portion of the cam portion on the outer peripheral surface of the inner diameter section of the roller clutch provided in alignment in phase in the circumferential direction with the rollers of the assembly, inserting the inner diameter section of the roller clutch below the rollers of the assembly, and then, utilizing the beveled section for engagement between the first fitting portion and second fitting portion to simultaneously compress the springs to provide the inner diameter section of the roller clutch on the radially inner side of the assembly, and j. then installing the second ball bearing between the inner peripheral surface of the pulley member and the outer peripheral surface of the shaft member.